

KNOWLEDGE, ATTITUDE AND PRACTICE AMONG SAUDI POPULATION OF URINARY TRACT STONES AND THEIR RADIOLOGICAL DIAGNOSTIC METHODS, SAUDI ARABIA, 2018

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ABSTRACT

Background: Urolithiasis is an ordinary complication with a growing incidence and occurrence worldwide. Urinary tract stone occurs from either migrated renal calculi or urinary stasis. It can further be divided into primary and secondary stones. Another types of kidney stones are classified into: the first and most common type is : Calcium stones which are consisted of calcium and oxalate, but sometimes consisted of calcium and phosphate. The second type is Uric Acid stones which are formed in high urine acidity. **Methodology:** A cross-sectional study based on a questionnaire distributed online to the participants which are males and females Saudis aged 18+ years old from all different

regions. And agreed to fill the questionnaire. **Results:** The level of poor knowledge of urinary tract stones is higher among female respondents than males (63% for females, and 29% for males). This pattern was also seen between males and females in both attitude and practice indicators. **Conclusions:** In conclusion, findings indicated that poor and moderate levels of knowledge, attitude and practice were the popular levels between respondents.

KEYWORDS: Urolithiasis is an ordinary popular levels between respondents.

INTRODUCTION

Urolithiasis is an ordinary complication with a growing incidence and occurrence worldwide.^[1] It varies geographically with a greater occurrence of stone formation in areas of hot climate as compared to moderate climates.^[2,3,4,5] A decrease in the intake of fluids as well

as increased perspiration and urinary concentration can lead to more crystallization and formation of stones. Aside from climatic conditions, other factors that could influence stone formation are genetics, dietary habits, water hardness, race, gender, age, occupation and body weight.^[1,4,6,7]

There are different types of kidney and bladder stones and they are formed under different conditions as well as demonstrate different symptoms. It's found that the most common types are renal and ureteral stones. Patients may complicate the ordinary and clear symptoms of renal colic and haematuria. Other patients may have no symptoms or those who have may feel vague or acute abdominal pain, nausea, increased number of urination, penile and testicular pain or difficulty in urinating.^[8] Bladder calculi occurs from either migrated renal calculi or urinary stasis. It can further be divided into primary and secondary stones. Some other common types of kidney stones are (see table 1); the most common type of stones are Calcium stones which are usually composed of calcium and oxalate but sometimes are composed of calcium and phosphate; Uric Acid stones are formed when urine acidity is high; Struvite stones which form as result of certain types of urinary infections such as bacterial infections and are composed of magnesium, ammonium and phosphate; and finally Cystine stones which are formed from natural body chemicals called cystine. These stones are rare and occur in people with genetic disorders that cause cystine to leak from the kidney into urine.^[9]

Table (1): Classification of kidney stones (BMJ, 2004).

Composition	Causative factors	Frequency (%)
Calcium oxalate, phosphate, or both	-Underlying metabolic abnormality -Idiopathic (25%)	60-80
Struvite (triple phosphate)	-Infection	10-15
Uric acid*	-Hyperuricaemia and hyperuricosuria Idiopathic (50%)	5-10
Cystine*	-Renal tubular defect	1
Other (xanthine, indigo, triamterene, indinavir*, etc)		1

*Pure uric acid and indinavir stones are radiolucent. Cystine stones are radio-opaque because of the sulphur content.

Kidney stone cases and the probability of them forming varies in different areas of the world; 1-5% in Asia, 5-9% in Europe, 13% in North America, 20% in Saudi Arabia. Stones which are formed in urinary tract, bladder or kidneys are differently composed of and located according to different regions. Metabolism and clinical patterns of stone disease also can

change over time in same region.^[11] There is a prevalence of kidney stone incidents in the industrial countries. This is strongly combined with the improved standards of living, race or ethnicity and area, region or residence.^[12] The saturation of calcium oxalate stones are seasonally variable, which are increased in summer for men and winter for women.^[13] The probability of stones formation are twice in men than women. In men, the peak age is often 30 years, but the average age in women is about 35 to 55 years. The probability of formation a second stone in kidney formed within 3-5 years are increased by 50%.^[14]

Epidemiology of stones formation and its main risk factors showed that renal stone disease has a higher incidence rate in men more than women, and in white Caucasians more than black people. Also the life style has a great factor affecting the appearance of stones in the upper urinary tract and increases in population living in highly industrialized countries with high consumption of animal protein. In the meanwhile, the bladder stones are clearly seen in the third world countries, due to very poor socio-economic conditions. Hypertensive patients and people with high body mass are showed to be very susceptible to stone formation. There is no evidence of any rise in the stone formation risk in relation to dietary calcium intake or tap water hardness.^[14]

Kidney stone symptoms rarely appear until the stone moves towards the ureter. At this point, the common symptoms noticed are^[15];

- Acute pains in the groin and/or side
- Concentrated urine with or without hematuria
- Nausea and vomiting
- Leucocytes in Urine
- Oliguria
- Dysuria
- Regular and persistent urination frequency.
- Fever and chills due to an urinary tract infection.^[15]

On the other hand, bladder stones symptoms may not appear straight away. But, if the stone irritates the bladder, symptoms can include the following^[16]:

- Discomfort or pain in the penis for males
- Frequent urination or a stop-start flow
- Slow urine flow
- Ache in the lower stomach area

- Hesitancy
- Hematuria
- Cloudy or abnormally dark urine.^[16]

There aren't any precisely identified causes of kidney stones but increase risks can be attributed to a family history of kidney stone, hypertension, gout, primary hyperparathyroidism, surgical menopause, insulin resistant states and chronic metabolic acidosis. Kidney stone occurrence in postmenopausal women is combined with a history of hypertension and lowered intake of dietary magnesium and calcium. Table 2 below shows anatomical abnormalities that make people more susceptible to kidney stones and the various drugs which increase the risk of kidney stones.^[10]

Anatomical abnormalities increasing risk of stone disease	Drugs increasing the risk of stone disease*
- Obstruction of the pelviureteral junction	- Decongestants: ephedrine, guaifenesin
- Hydronephrotic renal pelvis or calices	- Protease inhibitors: indinavir
- Calyceal diverticulum	- Anticonvulsants: felbamate, topiramate, and zonisamide
- Horseshoe kidney	- Diuretics: triamterene
- Ureterocele	
- Vesicoureteral reflux	
- Ureteral stricture	

*The non-dissolving carrier of osmotically controlled release oral (OROS) drugs may be misdiagnosed as kidney stones on x ray.

On the other hand, bladder stones are caused by either bladder outlet blockage or by damage of the nerves that control bladder function. It could also be caused by a neurogenic bladder, stroke, spinal cord injuries, Parkinson's disease, diabetes and an enlarged prostate.^[17]

One of the most important diagnostic tool of kidney stones is imaging. This is necessary as a first step to decide which therapeutic options to use for their management. The guidelines used are provided by the American College of Radiology, American Urological Association, and European Association of Urology. Patients who are suspected to have obstructive nephrolithiasis or ureterolithiasis are evaluated according to guidelines which differ regarding the optimal initial imaging modality. Computed Tomography is currently considered to be a gold standard by the American Urological Association and American College of Radiology to be used for evaluation of patients suffering from acute flank pain where clinical suspicion of nephrolithiasis exists. It is performed in more than 70% of patients receiving diagnosis. Bowel abnormalities, or free intra-abdominal air are initially screened for stones using

conventional or digital radiography. The monitoring of the passage of visible stones can be preferably done using radiographs due to the high radiation involved in CT. Plain film radiography of the kidney, ureter and bladder is also very helpful to evaluate the grade of stone growth in patients with known stone disease, but less useful in detection of acute stones clinically.

Despite of diagnosis by the MRI which provides the possibility of 3D imaging without exposure to radiation, it is costly and little stones are difficult to be clearly visualized. When age (<14 years), pregnancy and allergy to iodinated contrast material is involved, evaluation of patients for flank pain and hematuria should be done using Ultrasonography. But, in the event of an inconclusive US, CT is also recommended by the EAU as the modality of choice. In the emergency department, using proposed algorithms in assisting patients may be useful to decide the best approach. (Fig 1).

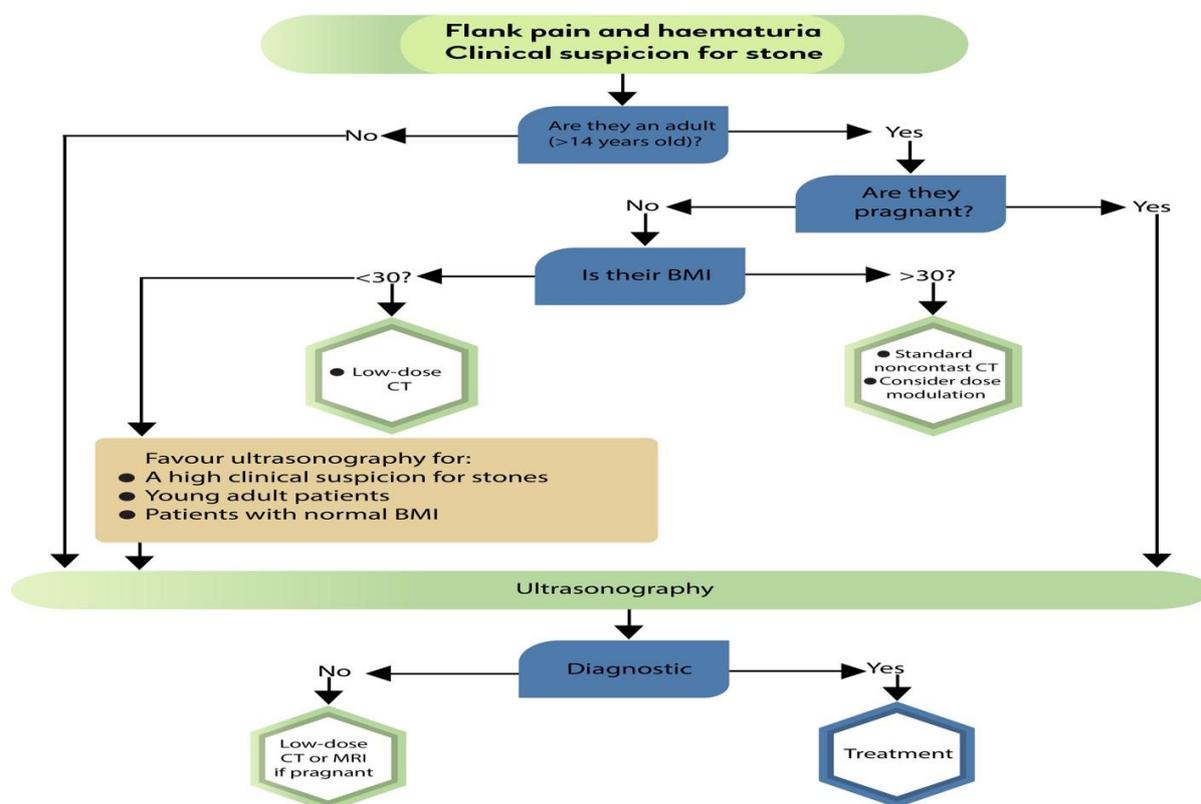


Figure 1: A proposed algorithm for imaging patients with acute stone disease in the emergency department.^[18]

Intravenous urography (IVU) (excretory urography) which is a traditional tool of examination for urinary stone diseases, could also be used as it provides important physiologic

information regarding the degree of obstruction and uses less radiation. But a disadvantage is its low sensitivity compared to CT, especially for small or non-obstructing stones.^[18]

Stones vary in size from 4mm to 8mm in diameter and their size is an important predictor of spontaneous passage. 4mm stones have an 80% chance of spontaneous passage while 8mm stones have a 20% chance. Other factors that determine the passage of stones is the exact shape and location of the stone.

In the case of an emergency and the possibility of renal failure, the focus of treatment should be on: correcting dehydration, treating urinary infections, preventing scarring and identifying patients with impaired kidney functions, to reduce the chances of acute kidney injury from nephrotoxicity, especially in patients with pre-existing azotemia, diabetes, dehydration or multiple myeloma. Adequate intravenous (IV) hydration is necessary to reduce the nephrotoxic effects of IV contrast agents.

Acetaminophen and observation can be used to treat patients with small stones and relatively mild hydronephrosis, while patients with more serious cases with intractable pain may require drainage with a stent or percutaneous nephrostomy. Acetaminophen can also be used in pregnancy for mild-to-moderate pain. Opioids, such as morphine and meperidine can be used, but it will cross the placental barrier. They can also cause respiratory depression in the fetus, so should never be used in the third trimester of pregnancy.^[19]

Surgical Care

Stones which are 4mm in diameter or smaller may pass spontaneously while those larger than 8mm probably require surgery as they are unlikely to pass through. Stones that are 5-8 mm in size may pass with MET, especially if they are located in the distal portion of ureters.

Indications and contraindications

Pain, infection and obstruction are primary indicator for surgical treatment. Other specific indicators include: Ureteral stone sizes more than 10 mm, distal ureteral stones less than or equal to 10 mm that have not passed after 4-6 weeks of observation, with or without MET Symptomatic, pediatric patients with ureteral stones and pregnant patients with ureteral or renal stones.

Contraindications to definitive stone manipulation include: Active, untreated UTI, uncorrected bleeding diathesis or pregnancy.^[20]

Bladder stones are a sign of an abnormality and require removal and treatment. Often an endoscopy is performed in cases of vesical calculi unless in situations where the stone is too large, too hard or the patient's urethra is too small to manipulate it. In this case, suprapubic surgery is preferred.^[20]

Pharmacologic Stone Dissolution

Urinary alkalization is the most effective medical treatment for bladder calculi. If urinary pH is raised to 6.5, stone dissolution may be possible using Potassium citrate 60 mEq/day. Further medical therapy will be ineffective if alkalization is overly aggressive as calcium phosphate will be deposited on the stone surface.^[21] Other agents, as Suby G or M solution, are rarely used. Although Renacidin is slow, but can be used to dissolve phosphate or struvite calculi, as it must be used in alongside indwelling irrigating catheters. Monitoring of patients must be done carefully for avoiding or detecting sepsis signs or hypermagnesemia. Irrigation of the bladder or continent diversions with saline for mechanical flushing of debris can also be done to prevent stone formation.^[22]

So the study aimed to assess the knowledge, attitude and practice of urinary tract stones amongst Saudi population, and its relation to different factors and associations.

METHODOLOGY

A cross-sectional study based on a questionnaire distributed online to the participants which are males and females Saudis aged 18+ years old from all different regions. And agreed to fill the questionnaire.

The questionnaire contained many different questions, in which all of them were close-ended questions. No personal, social or private questions were involved.

The questionnaire involved questions about background characteristics of the participants like gender, age, level of education and marital status in order to present personal and socio demographic data.

In addition to that the questionnaire included some questions to measure the level of the knowledge, attitudes and practice of population toward urinary tract stones and Their Radiological Diagnostic Methods. The questionnaire was pre-tested before data collection started.

The Study targeted to interview all 18+ years old people from both gender, who were living in Kingdom of Saudi Arabia and had its nationality, which means that the study sample contained adult males and females their age is above 18 years who agreed to be involved in the study and filled the Questionnaire. This means that exclusion criteria were: a) Non-Saudi population, b) Those whom are younger than 18 years old.

Finally, a sample of 662 participants was successfully interviewed. The size and sampling technique for the study is considered convenience, since we only interviewed participants within this predesignated period, also the mode of sampling is considered convenience sampling.

A structured data sheet was created to aid in data collection as a study tool, in addition, data was entered into the data sheet then into an Excel document, and this process was repeated for all variables. The duration of the data collection process was not exceeding four weeks.

After raw data was processed in accordance with the best practice for raw data management to identify any inaccuracies in advance to the statistical analysis. And in order to achieve that task, implausible values were flagged. A similar process was applied to categorical variables to identify any potential anomalies. All identified anomalies were discussed with biostatistics team and were corrected prior to initiation statistical analysis. Data was filled into appropriately designed excel sheet. Statistical analysis was done using SPSS V22. Descriptive statistics will be presented as number, percentages, means and standard deviation in that report. All statistical tests was declared significant at a P value of 0.05.

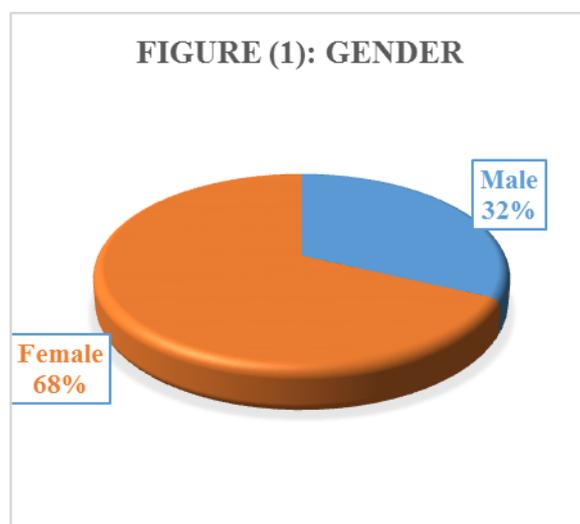
The ethical approval was obtained from the ethical committee of the Basic Health Research Centre of Majmaah University. Informed consent was obtained from the participants. The data was planned to be collected and was used for research purpose only and access to this data was for the principle investigator. Name and personal information of participants was not obtained as an ethical consideration.

RESULTS

A total of 662 participants were successfully interviewed. Since, the objective of this study was to assess the knowledge, attitude and practice of urinary tract stones amongst Saudi population, and its relation to different factors and associations. Through identifying the knowledge about urinary tract stones among the population, identifying the attitude of the

population towards urinary tract stones. Assessing the practice fostered by the population and whether or not it is affected by others. Knowing KAP within different factors and associations.

From data shown in figure (1), it is clear that sample contained female participants more than males (which is 68% and 32%, respectively).

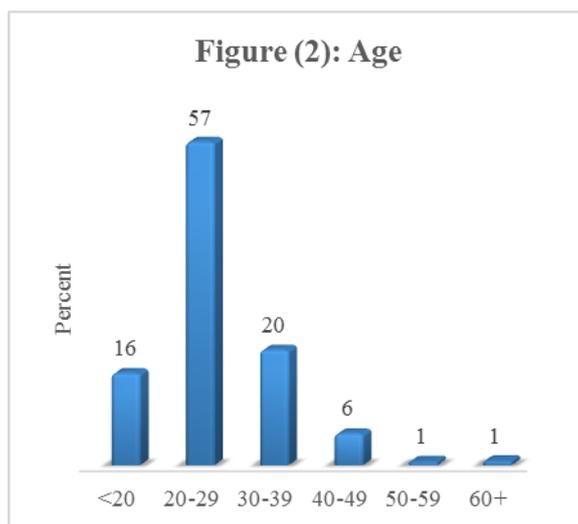


Nearly 43% of respondents were living in central region, 26% were in western region, and 11% were in eastern region, while 9% of the participants were living in northern region.

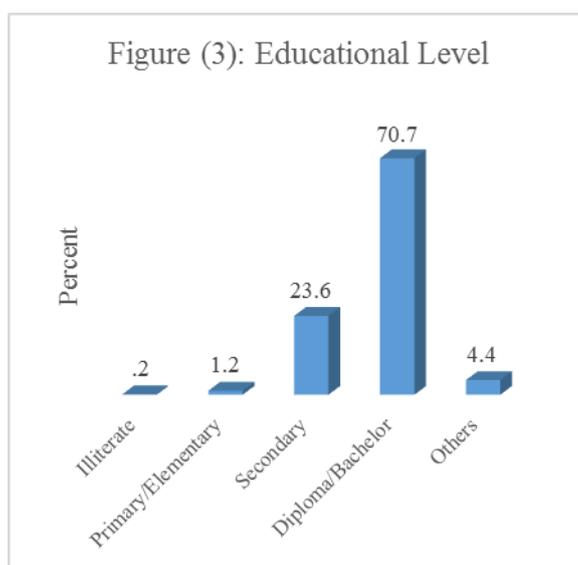
Table (3): Age groups.

	Frequency	Percent
Central region	282	42.6%
Northern region	56	8.5%
Western region	173	26.1%
Eastern region	79	11.9%
Southern region	72	10.9%
Total	662	100.0%

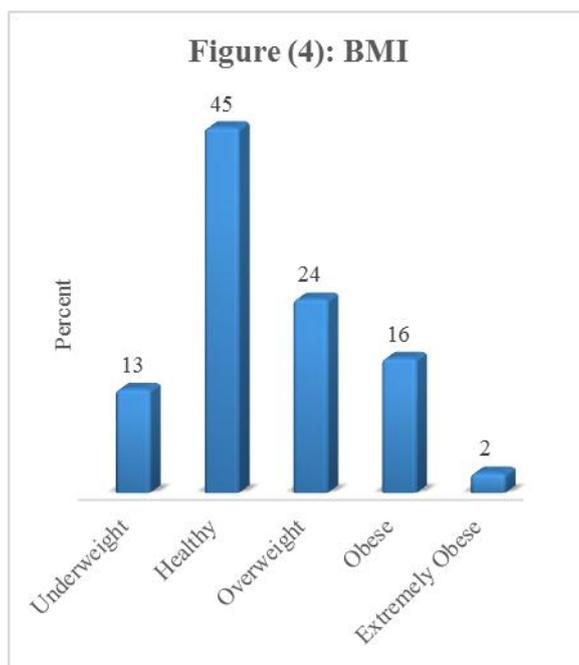
The age distribution of the sample in Figure (2) shows that more than half of the participants (57%) of the sample was aged between 20-29 years old, 20% of the respondents were aged between 30-39 years old, and only around 8% were aged 40 years or more.



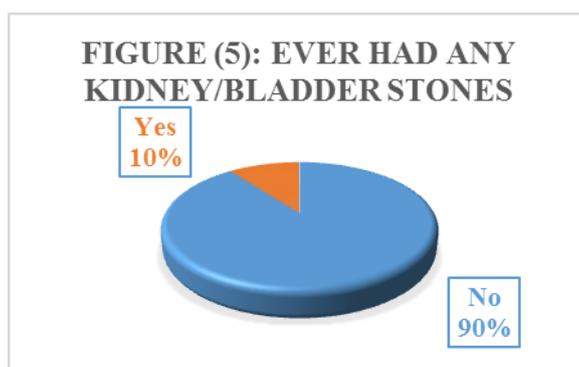
In addition, it was clear the most of sample were highly educated, where 71% of the participants had bachelor's degree, 24% of participants were having secondary education, while only one percent of respondents had less than secondary education. Figure (3) shows also that 4% of the respondents were having other education (above university education).



Data showed that slightly less than half (45%) respondents were in healthy mode according to their body mass index (BMI), 24% were overweighted, 16% were obese, and only 2% of respondents were in extreme obesity. However, 13% were underweight.



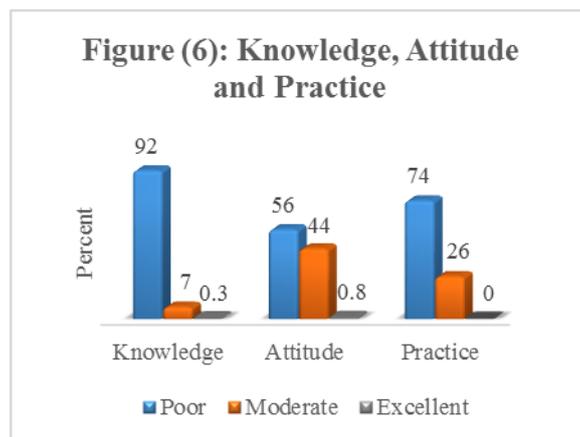
In addition, data also indicated that only 10% of respondents had kidney/bladder stones before, while the majority of them (90%) have not exposed before to any kidney/bladder stones.



According to the aim of the study which is to assess the knowledge, attitude and practice of urinary tract stones amongst Saudi population, and its relation to different factors and associations. The data showed that 92% of respondents were having poor knowledge about urinary tract stones, while only 7% were having moderate knowledge, while only less than half percent (0.3%) were having excellent knowledge about urinary tract stones.

Data presented in figure (6) showed also that 56% of respondents were having poor attitude towards urinary tract stones, and 44% were with moderate attitude. This pattern was also observed between respondents in their practice indicator towards urinary tract stones, around

three quarter of respondents were having poor practice toward urinary tract stones, and the remaining quarter was having moderate practice in dealing with urinary tract stones.



Concerning the relationship between knowledge, attitude and practice of urinary tract stones and respondents' characteristics (age, sex, education level, and body mass index), data presented in table (4) shows that level of poor knowledge of urinary tract stones is higher among female respondents than males (63% for females, and 29% for males). Female's percentage in poverty of attitude and practice were also higher than the male's.

Furthermore, we found that, respondents in age 20-29 years old were more likely to have poor knowledge level of urinary tract stones than respondents in any other age group, while all respondents with excellent knowledge about urinary tract stones were aged 30-39 years.

The 30-39 age group seemed to be the critical age group when talking about urinary tract stones, since the same pattern of knowledge was observed in attitude and practice indicators in the same age group (20-29 year).

However, the small percent of people with excellent knowledge about urinary tract stones, the majority of them were at least having university degree. While the majority of respondents with excellent attitude towards urinary tract stones were having secondary education.

Concerning the relationship between body mass index (BMI) and knowledge, attitude and practice of respondents towards urinary tract stones, the data indicated that most of respondents with excellent knowledge about urinary tract stones were in healthy mode or

overweighed (0.2% each). And also the majority of respondents with excellent attitude towards urinary tract stones were in healthy mode.

Table (4): Knowledge, Attitude and Practice of respondents toward urinary tract stones.

	Knowledge			Attitude			Practice		Total	Sig.
	Poor	Moderate	Excellent	Poor	Moderate	Excellent	Poor	Moderate		
Gender										
Male	29.0%	3.2%	0.2%	18.7%	13.1%	0.5%	24.0%	8.3%	214	0.767
Female	63.3%	4.2%	0.2%	36.9%	30.5%	0.3%	49.5%	18.1%	448	
Age										
<20	15.3%	.9%	0.0%	8.5%	7.4%	0.3%	12.7%	3.5%	107	0.210
20-29	51.8%	4.8%	0.0%	32.3%	23.9%	0.5%	39.4%	17.2%	375	
30-39	18.7%	1.2%	0.3%	11.0%	9.2%	0.0%	15.9%	4.4%	134	
40-49	5.3%	0.3%	0.0%	2.9%	2.7%	0.0%	4.5%	1.1%	37	
50-59	0.6%	0.0%	0.0%	0.5%	0.2%	0.0%	0.5%	0.2%	4	
60+	0.6%	0.2%	0.0%	0.5%	0.3%	0.0%	0.6%	0.2%	5	
Educational Level										
Illiterate	0.2%	0.0%	0.0%	0.2%	0.0%	0.0%	0.2%	0.0%	1	0.280
Primary/ Elementary	1.2%	0.0%	0.0%	0.5%	0.8%	0.0%	0.9%	0.3%	8	
Secondary	22.4%	1.2%	0.0%	13.1%	10.0%	0.5%	18.7%	4.8%	156	
Diploma/ Bachelor	64.7%	5.9%	0.2%	40.2%	30.2%	0.3%	50.3%	20.4%	468	
Others	3.9%	0.3%	0.2%	1.7%	2.7%	0.0%	3.5%	0.9%	29	
BMI										
Underweight	11.3%	1.4%	0.0%	7.3%	5.3%	0.2%	9.8%	2.9%	84	0.515
Healthy	41.4%	3.2%	0.2%	24.9%	19.3%	0.5%	32.2%	12.5%	296	
Overweight	21.6%	2.0%	0.2%	13.7%	10.0%	0.0%	16.8%	6.9%	157	
Obese	15.9%	0.6%	0.0%	8.9%	7.4%	0.2%	12.8%	3.6%	109	
Extremely Obese	2.1%	0.3%	0.0%	0.8%	1.7%	0.0%	2.0%	0.5%	16	
Total	92.3%	7.4%	0.3%	55.6%	43.7%	0.8%	73.6%	26.4%	662	

DISCUSSION

This study indicated that the participant's knowledge of urinary tract stones was better than their attitude and practice. Moreover, this study did not concentrate on the Knowledge, attitudes, and practice patterns among healthcare providers.

In November 2014, a study was conducted to know the Knowledge, attitudes, and practice patterns among healthcare providers in the prevention of recurrent kidney stones, in Northern Ontario.^[23]

This study showed that knowledge, attitudes, and adherence to guidelines have been reviewed in numerous medical conditions. Despite evidence-based recommendations from professional organizations, preventive services have shown to be delivered at low rates. Unfortunately, measures to improve preventive service delivery have not demonstrated optimal results. The results of the study mirror this recurrent literature finding.

Respondents demonstrated a reasonable level of knowledge regarding urinary tract stone prevention, but did not appear to effectively apply this knowledge in clinical practice. Although 70% of respondents were aware of preventive measures, only 43% applied their knowledge effectively in clinical practice. Reasons for the lack of application are unknown, but the treatment gap is clearly demonstrated in this study.

An increase in fluid intake remains the strongest recommendation in stone prevention. A randomized clinical trial showed that stones recurred in only 12 (12%) of the 99 patients who maintained a urine volume of about 2.6 L/day over 5 years, whereas stones recurred in 27 (27%) of the 100 patients in the control group, whose urine volume was about 1.2 L/day ($p = 0.008$). The experimental group showed a greater duration between recurrences than in the control group (38.7 vs. 25.1 months; $p = 0.016$).

Current literature suggests that patients should increase their fluid intake with a goal of maintaining a urine volume of 2 to 3 L per day. Only 20% of respondents advocate a urine output of 2 to 3 L per day for their kidney stone patients.^[24]

Unfortunately, the relationship of respondent's BMI indicator for our sample and knowledge, attitude and practice was statistically insignificant, unlike the study which conducted in February 2014 to know the epidemiological characteristics of renal stone patients age (21-60) and barriers in their dietary modification in Saurashtra Region.^[25]

That study showed the association between body weight and metabolic syndrome which was mentioned earlier may be the cause behind some cases of urinary stones in Saudi Arabia. This is particularly relevant in Saudi Arabia with one study reporting an alarming metabolic syndrome prevalence of 28.3%.

Increased urinary acid excretion maybe the cause behind this increase incidence amongst this group.

A study calculated an incidence rate of 111/100000 of urinary stones in Eastern Saudi Arabia with the majority of the patients having metabolic abnormalities. Of interest, half of the participants in this study associated obesity with the development of urinary stones which could indicate an increasing awareness of the morbidities associated with obesity.

CONCLUSION

In conclusion, findings indicated that poor and moderate levels of knowledge, attitude and practice were the popular levels between respondents. Data also showed that the relationships between respondents' background characteristics and their knowledge, attitude and practice towards urinary tract stones were not statistically significant.

Therefore, there is a great need to plan and implement a huge national educational campaigns to inform the population about urinary tract stones, in parallel to other forms of education programs which should be done on a national level to educate the population more about urinary tract stones.

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